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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/796,895	GIANNAKIS ET AL.	
	Examiner	Art Unit	
	Juan A. Torres	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,14-16,19-24 and 26-33* is/are rejected.

7)☒ Claim(s) *10-13,17,18 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 March 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/27/04 and 03/24/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statements (IDSs) submitted on 09/27/2004 and 03/24/2005 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Regarding information disclosure statement (IDS) submitted on 09/27/2004, reference numbers 21 and 43 (see left column) have been modified with what seems to be the appropriate date of publication; and reference 31 has been deleted because it is identical to reference 3.

Regarding information disclosure statement (IDS) submitted on 03/24/2005, reference number 65 (see left column) has been modified with what seems to be the appropriate date of publication; and reference number 82 has not been considered because doesn't include a date.

Drawings

The drawings are objected to because:

a) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "21" (see figure 3); "60" (see figure 5);

b) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "12" (see paragraph [0032] line 3 in page 6); "N_f" (see paragraph [0031] line 2 in page 6) "N_c" (see paragraph [0032] line 3 in page 7); "18" (see paragraph [0032]

line 7 in page 7; and paragraph [0033] line 1 page 7); "11" (see paragraph [0032] line 11 in page 7; and paragraph [0035] line 8 in page 8); "m^{th} ; m'^{th} ; $x_{m'}(n)$ (paragraph [0045] page 11) ; and

c) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "32" has been used to designate both Pulse shaping and Receiver (see figure 3).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because exceed 150 words in length. Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities:

a) In page 9 paragraph [0037] line 1 the recitation "Although T_g was set equal, the model can also include T_g as nonzero" is improper, because is not properly constructed; it is suggested to be changed to "Although T_g was set equal to zero, the model can also include T_g as nonzero" (emphasis added);

b) In page 9 paragraph [0037] line 2 the recitation "3to take" is improper, because is not properly constructed; it is suggested to be changed to "3 to take" (emphasis added);

c) In page 11 paragraph [0047] line 1 the recitation "Serial to parallel (S/P) converter 20 of transmitter 12" is improper, because S/P is block 21; it is suggested to be changed to "Serial to parallel (S/P) converter 21 of transmitter 12" (emphasis added);

d) In page 12 paragraph [0050] line 3 the recitation "Each block of Q frame-rate signals of data stream 43 is spread into a stream of P chips" is improper, because the

spreading block 25 spread data 24; it is suggested to be changed to "Each block of Q frame-rate signals of data stream 24 is spread into a stream of P chips" (emphasis added);

e) In page 14 paragraph [0053] line 9 the recitation "Receiver 14 receives the chip-sampled matched filter output 28 from matched filter 36" is improper, because the filter output is block 38; it is suggested to be changed to "Receiver 14 receives the chip-sampled matched filter output 38 from matched filter 36" (emphasis added); (it is assumed that block 32 (receiver) in figure 3 will be changed to block 14 [see also paragraph [0055] line 1; paragraph [0056] line 1; and paragraph [0061] line 1]);

f) In page 25 paragraph [0075] line 4 the recitation "FIG. 9 illustrates how the BER performance of a conventional IRMA" is improper (see figures 9 and 10); it is suggested to be changed to "FIG. 10 illustrates how the BER performance of a conventional IRMA" (emphasis added); and

g) In page 25 paragraph [0076] line 4 the recitation "In particular, FIG. 10 illustrates that the imperfect power control has no effect on the BER performance" is improper (see figures 10 and 11); it is suggested to be changed to "In particular, FIG. 11 illustrates that the imperfect power control has no effect on the BER performance" (emphasis added);

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Appropriate correction is required.

Claim Objections

Claim 13 is objected to because of the following informalities:

a) It is not disclosed what "u" means;

b) the recitation $u_A = u(\mathrm{mod}\, N_C)$ seems to be improper (see claim 11 and equation 61 in page 23); it is suggested to be changed to $u_A = u(\mathrm{mod}\, N_c)$ (using lower case "c")

c) the recitation $u_B = \left\lfloor \frac{u}{N_c} \right\rfloor$ seems to be improper; it is suggested to be changed to $u_B = u(\mathrm{mod}\, N_f)$ (see equations 61 and 62 in page 23).

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-9, 14-16, 19-24 and 26-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Le Martret ("All-Digital Impulse Radio for MUI/ISI-Resilient Transmissions through Frequency-Selective Multipath Channels," Proc. of MILCOM Conf., Los Angeles, CA, Oct. 22-25, 2000) in view of Zhou ("Chip-Interleaved Block-

Spread Code Division Multiple Access," IEEE Transactions on Communications, vol. 50, no. 2, pp. 235-248, February 2002) (Le Martret is co-author of this paper).

Regarding claims 1 and 33, Le Martret discloses generating a stream of frames from blocks of information bearing symbols, wherein the frames corresponding to different blocks of the symbols are interleaved (section 2.1, multiuser spreading, that is equivalent to symbol-spreading followed by frame interleaving, see provisional application 60453809 page 13 left column last paragraph); and outputting an ultra wideband (UWB) transmission signal from the stream of chips. Le Martret doesn't disclose generating a stream of chips from the stream of frames, wherein the chips corresponding to different frames are interleaved. Zhou discloses generating a stream of chips from the stream of frames, wherein the chips corresponding to different frames are interleaved (abstract; introduction 3rd paragraph; and section III CIBS-CDMA transceiver design). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the chip interleaving disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 2, Le Martret and Zhou disclose claim 1, Le Martret also discloses parsing the symbols into blocks of K symbols (section 2.1); applying an orthogonal set of spreading codes to the blocks of K symbols to form Q frames (section

2.1); and interleaving the Q frames to form the stream of frames (section 2.1, multiuser spreading, that is equivalent to symbol-spreading followed by frame interleaving).

Regarding claim 3, Le Martret and Zhou disclose claim 2, Zhou also discloses direct sequence code-division multiple access codes or digital carrier frequency division multiple access codes (section III CIBS-CDMA transceiver design 3rd and 4th paragraphs). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the direct sequence code-division multiple access codes or digital carrier frequency division multiple access codes disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 4, Le Martret and Zhou disclose claim 2, Le Martret also discloses applying an orthogonal set of time-hopping spreading codes to the interleaved frames to generate a plurality of chips for each frame (abstract; and section 2.1). Zhou also discloses interleaving each of the plurality of chips to form the output stream of chips (abstract; introduction 3rd paragraph; and section III CIBS-CDMA transceiver design). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the interleaving each of the plurality of chips to form the output stream of chips disclosed by Zhou. The suggestion/motivation

for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 5, Le Martret and Zhou disclose claim 4, Zhou also discloses storing the chips in an array having M columns and K+L rows, where L is a function of the communication channel length (section III CIBS-CDMA transceiver design 2nd paragraph and figure 4); and padding each column of the array with L guard chips (section III CIBS-CDMA transceiver design 2nd paragraph and figure 2). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the storing of the chips disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 6, Le Martret and Zhou disclose claim 5, Zhou also discloses that the guard chips comprise null values (section III CIBS-CDMA transceiver design 2nd paragraph and figure 2). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the null values disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 7, Le Martret and Zhou disclose claim 5, Zhou also discloses outputting the transmission signal by reading the chips from the array in column-wise fashion (section III CIBS-CDMA transceiver design figure 4). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the outputting of the transmission signal disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 8, Le Martret and Zhou disclose claim 5, Zhou also discloses that the set of time-hopping spreading codes are mutually orthogonal so that the interleaved and padded chips retain their orthogonality after passing through a multi-path communication channel (introduction 3rd paragraph; and section III CIBS-CDMA transceiver design). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the time-hopping spreading codes mutually orthogonal disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 9, Le Martret and Zhou disclose claim 5, Le Martret also discloses assigning each user of the group a common one of the set of time-hopping

spreading codes (section 2.1). Zhou also discloses assigning each of the set of spreading codes to a different user of a group of users (section III CIBS-CDMA transceiver design). Le Martret and Zhou teachings are analogous art because they are from the same field of end endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the assigning each of the set of spreading codes to a different user of a group of users disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 14, Le Martret and Zhou disclose claim 1, Le Martret also discloses receiving the signal (section 3 1st and 2nd paragraphs and figure 3); and outputting a stream of estimate symbols from the signal using de-spreading unit having a time-hopping de-spreading module (section 3 1st and 2nd paragraphs and figure 3). Zhou also discloses a multi-user de-spreading module (section III CIBS-CDMA transceiver design figure 4). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the multi-user de-spreading disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 15, Le Martret and Zhou disclose claim 14, Zhou also converting the signal to a stream of chips (introduction 3rd paragraph; and section III CIBS-CDMA transceiver design); applying a first de-spreading matrix with the time-hopping de-spreading module to de-interleave the chips into blocks of frames (introduction 3rd paragraph; and section III CIBS-CDMA transceiver design figure 4); and applying a single user detection scheme to the blocks of estimate symbols to output the stream of the estimate symbols (introduction 3rd paragraph; and section III CIBS-CDMA transceiver design figure 4). Le Martret also discloses applying a second de-spreading matrix to the blocks of frames with the multi-user de-spreading module to de-interleave the frames and produce blocks of estimate symbols (section 3 1st and 2nd paragraphs and figure 3). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the signal converting to a stream of chips disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 16, Le Martret and Zhou disclose claim 15, Zhou also discloses deterministically eliminates multiple user interference (introduction 3rd paragraph. Le Martret also discloses applying a second de-spreading matrix to the blocks of frames with the multi-user de-spreading module to de-interleave the frames and produce blocks of estimate symbols (section 3 1st and 2nd paragraphs and figure 3). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of

multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the deterministically elimination of multiple user interference disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 19, Le Martret discloses a multiple-user block-spreading unit that generates a set of frames for respective blocks of information bearing symbols and produces a stream of frames in which the frames from different sets are interleaved (section 2.1 and figure 3, multiuser spreading, that is equivalent to symbol-spreading followed by frame interleaving, see provisional application 60453809 page 13 left column last paragraph); a time-hopping block-spreading unit that generates a set of chips for each frame and outputs a stream of chips; and a pulse shaping unit to output an ultra wideband (UWB) transmission signal from the stream of interleaved chips (section 2.1 and figure 3, block spreading). Le Martret doesn't disclose that the chips generated from different frames are interleaved. Zhou discloses generating a stream of chips from the stream of frames, wherein the chips corresponding to different frames are interleaved (abstract; introduction 3rd paragraph; and section III CIBS-CDMA transceiver design). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the chip interleaving

disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 20, Le Martret and Zhou disclose claim 19, Le Martret also discloses parsing the symbols into blocks of K symbols (section 2.1); applying an orthogonal set of spreading codes to the blocks of K symbols to form Q frames (section 2.1); and interleaving the Q frames to form the stream of frames (section 2.1, multiuser spreading, that is equivalent to symbol-spreading followed by frame interleaving).

Regarding claim 21, Le Martret and Zhou disclose claim 20, Zhou also discloses direct sequence code-division multiple access codes or digital carrier frequency division multiple access codes (section III CIBS-CDMA transceiver design 3rd and 4th paragraphs). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the direct sequence code-division multiple access codes or digital carrier frequency division multiple access codes disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 22, Le Martret and Zhou disclose claim 20, Le Martret also discloses applying an orthogonal set of time-hopping spreading codes to the interleaved frames to generate a plurality of chips for each frame (abstract; and section 2.1). Zhou also discloses interleaving each of the plurality of chips to form the output stream of chips (abstract; introduction 3rd paragraph; and section III CIBS-CDMA transceiver

design). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret interleaving each of the plurality of chips to form the output stream of chips disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 23, Le Martret and Zhou disclose claim 22, Zhou also discloses storing the chips in an array having columns and rows, where he number of rows in the array is a function of the communication channel length (section III CIBS-CDMA transceiver design 2nd paragraph and figure 4); and padding each column of the array with guard chips and outputs the transmission signal by reading the chips from the array in column-wise fashion (section III CIBS-CDMA transceiver design 2nd paragraph and figures 2 and 4). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the chips storing disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 24, Le Martret and Zhou disclose claim 22, Zhou also discloses that the set of time-hopping spreading codes are mutually orthogonal so that the interleaved and padded chips retain their orthogonality after passing through a multi-

path communication channel (introduction 3rd paragraph; and section III CIBS-CDMA transceiver design). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the mutually orthogonally codes disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 26, Le Martret and Zhou disclose claim 19, Zhou also discloses a base station and a mobile device, a device within a personal area network, or a device within a sensor network (section II system modeling 3rd paragraph). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the base station and a mobile device disclosed by Zhou. The suggestion/motivation for doing so would have been to implement the system with a low complex multiuser interference (Zhou introduction 3rd paragraph).

Regarding claim 27, Le Martret discloses a wireless communication device comprising a two-state despreading unit that processes a received ultra wideband (UWB) transmission signal to produce estimate symbols, wherein the received UWB signal comprises a multi-user block-spread UWB signal formed from interleaved symbol frames (section 2.1 and figure 3, multiuser spreading, that is equivalent to symbol-spreading followed by frame interleaving, see provisional application 60453809 page 13

left column last paragraph). Le Martret doesn't disclose that the chips are interleaved. Zhou discloses generating a stream of chips from the stream of frames, wherein the chips corresponding to different frames are interleaved (abstract; introduction 3rd paragraph; and section III CIBS-CDMA transceiver design). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the chip interleaving disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 28, Le Martret and Zhou disclose claim 27, Le Martret also discloses a multi-user de-spreading module that applies a de-spreading matrix to de-interleave the frames and produce blocks of the estimate symbols (section 2.1 and figure 3, multiuser de-spreading). Zhou also discloses de-spreading matrix to de-interleave the chips into blocks of frames (section III CIBS-CDMA transceiver design 2nd paragraph and figure 4); and padding each column of the array with guard chips and outputs the transmission signal by reading the chips from the array in column-wise fashion (section III CIBS-CDMA transceiver design 2nd paragraph and figures 2 and 4). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the de-spreading disclosed by Zhou. The

suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 29, Le Martret and Zhou disclose claim 28, Zhou also discloses a base station and a mobile device, a device within a personal area network, or a device within a sensor network (section II system modeling 3rd paragraph). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the base station and a mobile device disclosed by Zhou. The suggestion/motivation for doing so would have been to implement the system with a low complex multiuser interference (Zhou introduction 3rd paragraph).

Regarding claim 30, Le Martret a wireless transmitter to transmit an ultra wideband (UWB) signal according to interleaved frames produced by blocks of information bearing symbols (section 2.1 and figure 3, multiuser spreading, that is equivalent to symbol-spreading followed by frame interleaving, see provisional application 60453809 page 13 left column last paragraph); and a wireless receiver to receive the UWB signal and de-interleave frames to produce estimate symbols (section 2.1 and figure 3).Le Martret doesn't disclose that the chips are interleaved and de-interleaved. Zhou discloses generating a stream of chips from the stream of frames, where the chips corresponding to different frames are interleaved in the transmitter and de-interleaved in the receiver (abstract; introduction 3rd paragraph; and section III CIBS-CDMA transceiver design figure 4). Le Martret and Zhou teachings are analogous art

because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the chip interleaving disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 31, Le Martret and Zhou disclose claim 30, Le Martret also discloses a multiple-user block-spreading unit that generates a set of the frames for the respective blocks of information bearing symbols and produces a stream of the frames in which the frames from different sets are interleaved (section 2.1 and figure 3); and a pulse shaping unit to output the UWB transmission signal from the stream of interleaved chips (section 2.1 and figure 3, w(t) is a pulse shape function, see 5.1 2nd paragraph). Zhou also discloses a time-hopping block-spreading unit that generates a set of the chips for each of the frames and outputs a stream of the chips in which the chips generated from different frames are interleaved (section III CIBS-CDMA transceiver design figure 4). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the time-hopping block-spreading unit disclosed by Zhou. The suggestion/motivation for doing so would have been to reduce the multiuser interference with low-complexity (Zhou introduction 3rd paragraph).

Regarding claim 32, Le Martret and Zhou disclose claim 30, Le Martret also discloses a multi-user de-spreading module that applies a de-spreading matrix to de-interleave the frames and produce blocks of the estimate symbols (section 2.1 and figure 3, multiuser de-spreading). Zhou also discloses de-spreading matrix to de-interleave the chips into blocks of frames (section III CIBS-CDMA transceiver design 2nd paragraph and figure 4); and padding each column of the array with guard chips and outputs the transmission signal by reading the chips from the array in column-wise fashion (section III CIBS-CDMA transceiver design 2nd paragraph and figures 2 and 4). Le Martret and Zhou teachings are analogous art because they are from the same field of endeavor of multiuser communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the multiuser technique disclosed by Le Martret the de-spreading disclosed by Zhou. The suggestion/motivation for doing so would have been to recover the transmitted signal using a low complexity multiuser interference (Zhou introduction 3rd paragraph).

Allowable Subject Matter

Claims 10-12, 17-18 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if the objections to claims 13 are overcome (see above), and if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

a) Molev-Shteiman (US 6301288 B1) discloses chip interleaving in direct sequence spread spectrum (DSSS) modulation;

b) Hayashi (US 20040028004 A1) discloses a radio communication system with adaptive interleaver using frame interleaving;

c) Juntti (US 6678314 B2) discloses frame interleaving; and

d) Kitagawa (US 6636723 B1) discloses CDMA radio communication system using chip interleaving

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is 571-272-3119. The examiner can normally be reached on 8-6 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Juan Alberto Torres
06-26-2007